THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

January 16, 2006 File: 15-85-11

Alberta Infrastructure and Transportation
Room 223, Provincial Building
4709-44 Avenue
Stony Plain, Alberta
T7Z 1N4

Attention: Mr. Michael Baik

NORTH CENTRAL REGION GEOHAZARD ASSESSMENT

HWY 661:02 NEAR THE NORTHEAST BOUNDARY OF THE TOWN OF FT. ASSINIBOINE (NC14) 2005 ANNUAL INSPECTION REPORT

Dear Sir;

This letter documents the 2005 annual site inspection of an area of slope instability located along Hwy 661:02 located on the northeast boundary of the Town of Ft. Assiniboine, Alberta (refer to Figure NC14-1, Section F). Thurber Engineering Ltd. (Thurber) undertook this inspection in partial fulfillment of our Geotechnical Services for Geohazard Assessment, Instrumentation Monitoring and Related Work contract (CE046/2004) with Alberta Infrastructure and Transportation (AIT).

Mr. Renato Clementino, P.Eng of Thurber undertook the inspection on May 24, 2005 in the presence of Mr. Roger Skirrow, P. Eng. and Mr. Rick Ellwein of AIT.

1. BACKGROUND

Thurber last visited the site in June 2004 and the site condition at that time is described in our Part B assessment letter in the site binder. Additional information of the site is provided in the Geotechnical File Review in Section A and Section G of the binder.

2. SITE OBSERVATIONS

The changes in condition since last year are shown on the attached site sketch plans in Figure NC14-1 (overview) and NC14-2 (detail of the mid-hill slide area). A cross-section prepared by AGRA Earth & Environmental passing through the main portion of the slide was presented in Thurber's (2000) report as Figure NC14-3 and is included in Section F of the binder for your reference. Selected photographs taken during the visit are also attached.

According to Mr. Rick Ellwein, this section of the highway was patched in 2003 covering the crack features; however, the cracks are reappearing through the patch at the same pattern as before. Two new crack patterns were noted, however, one at the north side and the other in the south side of the mid-hill slide area as shown in the Figures NC14-1 and NC14-2. No differential drop across the cracks was observed.

The groundwater elevation at only operational standpipe piezometer located at west side of the mid-hill area was approximately at 11.5 m below ground surface.

Other slide features, i.e., scarps and graben, existing on the sideslope were inspected and no noticeable changes were observed. Two new sinkholes, however, were noted as shown in Figure NC14-1.

The collection well (CSP) located at the toe of the mid-hill slope was opened and inspected this year. Five 38 mm (1.5") diameter plastic drains were found protruding from the east side of the manhole wall (see attached photo in Section F). The pipes were weeping at the time of the inspection. The manhole was 600 mm in diameter and 5 m deep. Water accumulation at the bottom of the manhole was measured at 2.35 m from the bottom. From the oxidation stain on the manhole wall it can be assumed that the water level in manhole has reached and elevation in at least about 1.5 m higher than the current elevation.

The manhole consisting of a CSP located on the south side of the backslope was also inspected but the lid could not be removed. This manhole has some holes on the side above ground level that collects surface water. These holes were mainly clogged and water was ponding at the east side of the manhole. These holes were cleaned with a stick and water started to flow into the manhole.

Mr. Rick Ellwein informed us that significant precipitation had occurred in the area this year.

3. ASSESSMENT

As discussed in previous reports, the slope instability for this site appears to be related to high water level; consequently, the rate of slope movement is linked to groundwater condition. Based on the observations from the last few years, it appears that the slope movement rates have reduced to an ongoing creep movement. Slope movement may increase as groundwater elevation increases.

The oxidation stain observed on the collection well (CSP) at the toe of the slope shows that this site was subjected to higher water elevation some time in the past, which concurs with the higher rate of movements observed in previous years at this site.

4. RISK LEVEL

The risk level for this site has been assessed as follows:

PF(9) * CF(4) = 36

A Probability Factor of 9 is considered appropriate since the slide is active with a moderate steady rate of ongoing movement. A Consequence Factor of 4 is considered appropriate since the embankment fill is fairly high and a partial closure of the road would be a direct result of an aggressive slide movement.

5. RECOMMENDATIONS

5.1 Short Term

In the short term the site should be regularly inspected by the MCI especially after heavy and long precipitation events to determine a positive relationship between groundwater condition and slope movement.

5.2 Long Term

High groundwater levels appear to be the major cause of the instability at this site, however insufficient information is available on the source and distribution of the groundwater to allow detailed assessment of remedial measures. A hydrogeological assessment has been undertaken, and additional field work including geotechnical instrumentation installation and geometric assessment has already been proposed (Thurber proposal dated September 8, 2005) to determine the feasibility of realignment of the roadway upslope of its present location.

5.3 Investigation

In order to evaluate geological and hydrogeological conditions in the vicinity and above the slide area, test holes and instrumentation installations are required as recommended in our Hydrogeological Assessment report dated January 30, 2003 to AIT. The test hole and instrumentation locations and depth are shown in Figure NC14-1.

A proposal with a geotechnical investigation and instrumentation monitoring program for this site was also submitted by Thurber to AIT on September 8, 2005.

5.4 Maintenance

As a maintenance item for short term improvement of the slope stability it is recommended to inspect and clean the existing collection points to improve groundwater discharge that seems to be decreasing over the years possibly due to siltation in the collection points.

Consideration should be given to installing a surface drainage treatment around the collection point located at the south end of the backslope to reduce the potential of having the existing holes clogged. This treatment may consist of excavating around the perimeter of the manhole to expose the holes and cover the exposed perimeter and holes with non-woven geotextile and backfill with wash rock. This should allow the surface water to enter the manhole and minimize the risk of having silt clogging the holes.

6. CLOSURE

We trust this assessment and recommendations meet with your needs at this time. Please contact the undersigned should questions arise or if the slide condition worsens.

Yours very truly,
Thurber Engineering Ltd.
Dimitri Papanicolas, P.Eng.
Review Principal

Renato Clementino, P.Eng.
Project Engineer

Attachments